(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
8 February 2001 (08.02.2001)

PCT

(10) International Publication Number
WO 01/08882 A2

(51) International Patent Classification[7]: B32B 27/00

(21) International Application Number: PCT/IB00/01818

(22) International Filing Date: 26 July 2000 (26.07.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

199 35 408.1	30 July 1999 (30.07.1999)	DE
199 35 531.2	30 July 1999 (30.07.1999)	DE
199 50 057.6	16 October 1999 (16.10.1999)	DE
199 52 432.7	30 October 1999 (30.10.1999)	DE
199 55 713.6	18 November 1999 (18.11.1999)	DE
199 55 730.6	18 November 1999 (18.11.1999)	DE

(71) Applicant: **JOHNS MANVILLE INTERNATIONAL, INC.** [US/US]; 717 Seventeenth Street, Denver, CO 80202 (US).

(72) Inventors: **GROH, Werner**; Nebelhornstrasse 32, 86830 Schwabmünchen (DE). **SCHÖPS, Michael**; Am Ringsee 6, 86845 Grossaitingen (DE). **SEISS, Willi**; In der Strütt 27, 97906 Faulbach (DE). **SCHWARZ, Rolf**; Reichenberger Strasse 43, 97877 Wertheim (DE). **NAGL, Monika**; Völkstrasse 6, 86150 Augsburg (DE). **GREISER, Wolfgang**; Am Maiers Kreuz 6, 86356 Neusäss (DE). **ZEINER, Michael**; Reichenberger Strasse 161, 97877 Wertheim (DE). **UMMINGER, Jürgen**; Bürgermeister Weid Strasse 7, 97922 Lauda-Königshofen (DE).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW) , Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM) , European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE) , OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *Without international search report and to be republished upon receipt of that report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 01/08882 A2

(54) Title: NON-WOVEN LAMINATE COMPOSITE WITH BINDER

(57) Abstract: The present invention provides non-woven laminate and the production thereof. The laminate includes at least one pre-consolidated non-woven layer containing glass staple fibers needled with at least one thermally shrunken non-woven layer of synthetic fibers. A portion of the fibers of the upper synthetic non-woven layer passes through the non-woven layer of glass fibers possibly through the underlying synthetic non-woven layer. The laminate contains a consolidation binder.

NON-WOVEN LAMINATE COMPOSITE WITH BINDER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a method of fabricating multilayer laminates made of at least one non-woven layer of inorganic staple fibers and at least one non-woven layer of organic synthetic fibers, the product and use thereof.

2. Description of the Related Art

Laminates composed of bonded fabrics are useful in wall and floor coverings of constructions such as residential and commercial structures. They are particularly useful in the roofing felts and insulation, where the laminates are utilized as support material. The bonded fabrics find particular applicability as carrier in bituminized roofing felts and membranes. Naturally, these laminates can be coated with other materials such as polyvinyl chloride.

Various laminates fabricated form at least a non-woven synthetic fibers and non-woven mineral materials are known in the industry. For example, EP 0 176 847 A2 discloses a laminate composed of a non-woven of man-made fibers, in particular of a polyester filament and a non-woven layer of mineral fibers. The non-woven of man-made fibers and also the non-woven of mineral fibers are pre-consolidated and then bonded together by needling.

European Patent Document 0 242 524 B1 suggests adding reinforcement yarns in a lengthwise direction, wherein the non-woven material is made of mineral fibers. Example B, discloses that final consolidation of the composite as being accomplished by adding a commonly known binder in the art.

European Patent Document 0379 100 B1 discloses a laminate made of a filamentous non-woven and a glass fiber non-woven, wherein the laminate is produced by first pre-consolidating glass fiber non-wovens and then needling the non-woven with synthetic fibers non-woven. Subsequently, final setting is completed with an aqueous solution of a melamine formaldehyde precondensate free from polymeride, said precondensate showing a molar ratio melamine/formaldehyde of 1:1.0 to 1:3.5, wherein about 0.5 to 5% by weight of a usual accelerator have been added to the solution.

Similar double-ply laminates are described in South African Document ZA 94/02763 A. Additionally, the South African document discloses, inter alia, a three-layer laminate where a non-woven of glass staple fibers is placed between two filament non-wovens of polyester prestabilized by needling whereupon the three layers are bonded together by a further needling process. The filaments of the polyester non-woven are drawn through the non-woven of glass staple fibers.

DE 195 21 838 A1 describes a compact bonded fabric which is made of at least three layers, the intermediate layer being a fabric of organic fibers provided on both

sides with a reinforcement layer. Preferably, the two reinforcement layers are made of inorganic fibers. It is further suggested therein to reinforce the bonded fabric by needling and/or by conglutinating with thermal or chemical binders.

EP 0 603 633 B1 describes a flame-retarding laminate of at least one layer of a consolidated spun-laid non-woven, a scrim layer of glass fibers and a metallic foil. The laminate described therein may likewise consist of a scrim of glass fibers which lies in sandwich-like manner between two non-woven layers of polyester filaments and additionally include the prescribed metallic foil. The glass fibers of the scrim layer are threads of glass, that is to say multifilament threads of glass. The glass threads may show a producer twist but they may be likewise present as non-twisted filament bundles. The layers may be mechanically consolidated, (e.g., by needling) or by means of a chemical binder (e.g., polyvinyl alcohol or butadiene styrene co-polymerized). Thermoplastic adhesives, in particular in form of fibers, may likewise be utilized.

Additional multilayered laminates are described in European Patent Document EP 0 187 824 B1, which includes, inter alia, a textile fiber layer from laid organic fibers. The laminates are treated with a binder on the basis of Fluor polymer dispersions.

European Patent Document EP 0 403 403 discloses multilayered structures where non-wovens of polyester staple fibers are utilized in addition to non-wovens of

glass fibers. The glass staple fibers therein need to be very exactly oriented in parallel to the surface.

European Patent Document EP 0 572 891 A1 describes laminates of non-woven and scrim which, except for the metallic foil, show a similar construction as those depicted in EP 0 603 633 B1. These laminates are likewise treated with binders.

European Patent Document EP 0 806 509 describes a support layer which, inter alia, contains a fabric and a reinforcement, wherein the reinforcement serves to neutralize forces, in particular where the elongation ranges between 0 and 1% elongation. Herein, the use of a binder is also suggested.

Some of the disadvantages associated with the laminates described-above include lack of mechanical strength (i.e., delamination), dimensional stability, tear propagation and flame retardant properties.

To meet the requirements of the roofing, sealing, flooring and insulating industries and to overcome the disadvantages of the related art, it is an object of the present invention to provide bonded fabrics or laminates made of at least one non-woven layer of organic synthetic fibers and a non-woven layer of inorganic staple fibers, which is produced in a quick and facile manner.

It is another object of the present invention to provide a laminate which is subjected to final

consolidation through the use of a binder, and provides improved mechanical strength.

It is a further object of the present invention to utilize the laminates as carrier webs and in particular bitumen webs having minimized „banana curving effect.„

It is yet another object of the present invention to provide laminates which are capable of being saturated with bitumen or other synthetics and serve as roofing felts, sealing membranes and the like.

It is another object of the present invention to provide a method for the production of a laminate which exhibits improved dimensional stability during and after bituminization, and good flame retarding properties.

It is yet another object of the invention to provide laminates, which as bituminized webs or membranes, the proportion of the synthetic non-wovens vis-a-vis the proportion of non-woven of glass fibers can be reduced without the occurrence of marked drawbacks to bonded fabric, and yet have improved fire retardant characteristics.

Other objects and aspects of the invention will become apparent to one of ordinary skill in the art upon review of the specification and claims appended hereto.

SUMMARY OF THE INVENTION

In accordance with the inventive laminate and method of production thereof, it has been determined that a laminate of two or more layers wherein the

laminate is subjected to a final consolidation through the use of a binder.

In accordance to one aspect of the invention, a laminate is provided. The laminate includes at least one pre-consolidated non-woven layer containing glass staple fibers needled with at least one thermally shrunken non-woven layer of synthetic fibers. A portion of the fibers of the upper synthetic non-woven layer passes through the non-woven layer of glass fibers possibly through the underlying synthetic non-woven layer. The laminate contains a consolidation binder.

In accordance with another aspect of the invention a method for the production of a laminate of two or more layers is provided. One or more non-woven mat containing glass staple fibers is pre-consolidated with a resin, then placed beneath or between the non-woven layers of synthetic fibers, wherein the non-woven layers of synthetic fibers and the pre-consolidated non-woven mat containing glass fibers are bonded together by needling in such that a part of the fibers of the upper synthetic non-woven passes through the non-woven layer, heat shrinking the synthetic fibers subjecting the laminate to a final consolidation through the use of a binder.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

The invention will now be described with reference to exemplary embodiments thereof. In a first aspect of the invention at least one non-woven mat containing

glass staple fibers and at least one layer of a non-woven synthetic fibers as a further layer. As defined herein, a mat consists of staple fibers (e.g., glass or synthetic ones) or one or more layers of filamentary fibers. The two or more layers are bounded together by needling in such a way that a portion of the fibers of the synthetic non-woven layer passes through the non-woven of glass fibers. The two or more layers are bounded together by needling in a manner where the synthetic fiber may extend through the entire non-woven mat of glass fibers.

The non-woven of synthetic material can be staple fibers, but preferably filamentous fibers. These filamentous fibers are also known to those skilled in the art as „endless„ or continuous fibers. The staple fibers or filaments may be present as multicomponent fibers, in particular as bico fibers which are well known in the art. Suitable fiber materials can be selected from a group of polymers or copolymers such as polyester, poly(ethylene terephthalate), polypropylene, , polyamides or polyolefins. Preferably, polypropylene and more preferably poly(ethylene terephthalate) are employed. In an exemplary embodiment, the synthetic non-wovens can be pre-consolidated mechanically, hydrodynamically, thermally or by calendering at temperatures where the synthetic fibers would shrink in totality. Further, the synthetic non-woven can be shrunk prior to bonding with the glass non-woven layer, prior or after pre-consolidation, but preferably before bonding with the glass fiber non-woven.

Naturally, the laminate can include a third layer of synthetic fibers, thus sandwiching the non-woven glass fiber mat therebetween. Where there are two or more non-woven synthetics and in particular two filamentous non-woven layers of polyester present, it is preferred that the ratio of the gsm substance (i.e., weight per area, preferably measured in grams per square meter) of the non-wovens lie in the range of about 1:1 to 1:5. Preferably, the ratio of the gsm substance of these non-wovens lies between 1:1 and 1:2, and preferably the non-wovens are not consolidating prior to needling.

In a preferred embodiment, the pre-fabricated glass non-woven mat is pre-consolidated with a binder prior to bonding to the synthetic non-woven by needling. The diameter of the glass fibers is about 8 to 16 μm, and preferably about 10 to 13 μm. The length of the fibers is about 8 to 32 mm, and preferably 8 to 18 mm. Suitable binder which can be utilized include, for example, urea formaldehyde, melamine formaldehyde, phenolic, epoxy, vinyl acetate, polyvinyl chloride, vinyl alcohol, acrylate and other thermoplastic and thermosetting resin. The amount of the applied binder is about 5 to 45 weight percent, and preferably 10 to 30 weight percent of the non-woven glass fibers.

It will readily be recognized by the skilled artisan that up to 40 percent of the glass fibers can be substituted by other fibers. In particular, cellulose based fibers, polyacrylonitrile, polyester, polyamide, etc.

The glass mat may be produced using a dry process, but is preferably made using a wet process. Thus, the gsm substance of the glass mat ranges from about 30 to 150 g/m^2. Even more preferably, the gsm substance ranges from about 50 to 90 g/m^2.

Subsequently, the laminate formed is subjected to a final consolidation through the application of a binder. Suitable binders for the final consolidation include urea formaldehyde, melamine formaldehyde. Commercially available acrylate or styrene binders are preferably employed in an amount ranging from about 3 to 35 weight percent, and most preferably about 10 to 18 weight percent of the laminate. Besides the binders mentioned above, copolymers of styrene, butadiene, acrylates and mixtures of duroplastic binders such as urea and melamine resins can be also used.

The non-woven layer of glass fibers may include a reinforcement in the form of staple fiber yarns, multifilament yarns, monofils or threads of glass, or other synthetic materials, such as high tenacity polyethylene, aramide, polyester disposed in the longitudinal direction and other reinforcing materials in the form of scrims. Scrims as used herein, includes laid layers of filaments, as well as woven filaments. The reinforcing filaments, yarns or scrims can also be disposed at any angle to the longitudinal or cross direction, e.g. 10 to 30 degrees. In addition, the reinforcement materials may be disposed between or in other layers. The reinforcements are placed from about 1 to 35 mm apart. The titre of the treads are about 200 to 1500 dtex, and preferably about 300 to 700 dtex. It

will readily be recognized by those skilled in the art that dtex or tex is a unit of measurement of g/10,000 m or g/1,000 m, respectively.

The laminate can be produced through either a on-line or off-line process. In accordance with another exemplary embodiment of the invention, a double-ply or layer laminate in the off-line process in manufactured. The laminate includes a pre-consolidated filamentary non-woven of polyester and a pre-consolidated non-woven of glass staple fibers. The non-woven of polyester is pre-consolidated by needling.

The organic synthetic non-woven is preferably made of polyester fibers by the spunbond method described in DE-OS 24 60 755 and herein incorporated by reference in its entirety. Preferably, the synthetic employed is a poly(ethylene terephtalate) or a copolyester. Thereafter, pre-consolidation by needling is performed where 10 to 40 stitches per cm^2 are placed. The pre-consolidated filamentary non-woven exhibits a gsm substance ranging from about 30 to 350 g/m^2 and preferably 100 to 230 g/m^2. Shrinking of the fibers can be executed prior to or optionally after the pre-consolidation. Heat is applied at temperatures in the range of 140 to 220°C or temperatures corresponding to bitumen containing bath employed to impregnate the laminate with bitumen. Other methods of pre-consolidation such as mechanically, hydrodynamically, thermally (e.g., calender) are contemplated by the inventors and within the scope of the invention.

The non-woven of glass fiber is produced in accordance to a so-called wet process wherein fibers of the E or C class and mixtures thereof or other commercially available glass such as ECR glass are pre-consolidated with a urea, melamine and other binder resins, as discussed above. It will readily be recognized by the skilled artisan that up to 40 percent of the glass fibers can be substituted by other fibers. In particular, cellulose based fibers, polyacrylonitrile, polyester, polyamide, etc.

Wet setting is performed, and a coating ranging from about 5 to 45 percent, and preferably from about 10 to 30 percent is applied. Thus, the gsm substance ranges from about 30 to 120 g/m^2, and preferably about 50 to 90 g/m^2. Additionally, reinforcing additives and yarns such as the ones discussed with reference to the previous embodiment can be added to the non-woven glass fiber layer. The pre-consolidated non-wovens of glass are particularly advantageous, as found in a stress-strain-plot measured in the lengthwise direction with a specimen having a width of 5 cm at least 100 N of stress applied, an elongation of < 3%, preferably of < 2.5% is exhibited.

The two non-woven layer pre-fabricated are superposed and bounded together by needling. The polyester filaments are advanced in order for at least a part of the filaments to penetrate the non-woven of glass fibers to the side facing away from the synthetic non-woven and possibly cling thereto. Thereafter, the laminate is subjected to a final consolidation by a binder.

In yet another preferred embodiment, three or more layer laminates are manufactured. For example, a glass fiber layer is disposed on an outer polyester layer, followed by application of a second polyester layer thereon, resulting in a laminate having at least one outer polyester layer.

The off-line process is characterized in that the non-woven of synthetic and the non-woven of glass fibers are separately produced. The synthetic fibers are heat treated by conveying the non-woven through an oven at temperatures of about 140 to about 220°C, in such a manner that subsequent treatment will not induce shrinkage of the fibers and/or non-woven. The non-wovens thus produced are then combined with the non-woven of glass fiber by needling with needles. Accordingly, the use of a binder is needed to consolidate the layers regardless of the method employed.

In the on-line process, the non-woven of glass is introduced into the laminate in the course of production of the non-woven of synthetic layers. Particularly, one or several curtains of polyester filaments are first deposited on a moving conveyor line. The non-woven of glass fiber is laid upon the one or more layers of polyester, and thereupon additional layers of polyester or are optionally deposited thereon. The non-woven layers of polyester are subjected to heat shrinking prior to combining the different layers, or optionally afterwards.

In accordance with a preferred embodiment, the non-woven of glass is introduced between spunbonds of synthetic non-woven layers of polyester by the so-called on-line process. Spin beams corresponding to the fiber curtains produced (i.e.the synthetic non-woven) are spun or drawn through ducts on a moving deposition area such as a conveyor. Thereupon, the prefabricated non-woven layer of glass staple fibers is laid upon the pre-consolidated or non-preconsolidated non-woven layer of polyester filament and vice versa. Additional layers are added as desired. In the preferred embodiment, the upper and lower layers of polyester having equal or differing gsm substances are produced and energy in the form of heat is applied to shrink the fibers.

In a similar manner, when a double-ply laminate is manufactured, corresponding spin beams are employed to produce the non-wovens, and wherein the synthetic non-woven is deposited on the pre-fabricated glass mat. In a preferred embodiment the synthetic filamental non-woven are shrunk prior to bonding. After the needling a binder is subsequently employed for final consolidation of the carrier/laminate.

The final consolidation of the layers is performed by subjecting the laminate to a binder such as the one discussed above. In particular, the binder is introduced into the laminate from both sides (i.e., by dipping the laminate into a binder bath in order that the stabilizing effect of the binder can take place in the outer and inner layers). The synthetic filaments which penetrate through the glass fiber are fixed by the binder on the surface of the glass fiber non-woven, away

from the synthetic non-woven where they are securely anchored.

The synthetic fibers may be shrunk separately, and therefore before a non-woven is produced using these shrunken fibers. Preferably the organic fibers are shrunk when they are present in the form of a non-woven or in the form of corresponding layers. The shrinking may take place before a mechanical or hydro-dynamical pre-consolidation. Optionally, the non-woven is shrunk after a corresponding pre-consolidation. The shrinking is preferably performed by heating in an oven at temperature of about 140 to 220°C.

In order to obtain a desired final thickness of the laminate the needled laminate/composite can be compressed by treatment with a commercially available calender, a fabric/belt calender or a laminate calender.

In case the synthetic non-wovens are pre-consolidated by needling, 10 to 40 stitches per cm^2 are placed. Subsequently, the layers are bounded by needling in such a manner where a part of the polyester filaments protrude through the lower surface of the composite/laminate. The needling preferably places 20 to 50 stitches per cm^2. Naturally, pre-consolidation of the synthetic non-woven and final consolidation of the laminate can be executed in one step, thus eliminating the separate pre-consolidation by needling.

The method employed is the on-line or off-line process as discussed above. The needles utilized therein include a distance between the needle point and

the barb of approximately 2 to 4 mm. To avoid rupturing or simply damaging the glass fibers, laminate needling is performed at a forward feed ratio at preferably less than 14 mm/stroke. An additional benefit is a significant reduction in glass dust produced.

The glass fiber non-woven layer remains largely intact and presents a considerable improvement with respect to fire retardancy. Additionally, due to the integrity of the glass non-woven obtained, a high stability is attained.

The needles utilized in the present embodiments in conjunction with the forward feed ratio of the stroke maintain a small draft. A draft, as herein defined, occurs when a needle sticks into the non-woven, thereby moving the non-woven in the direction the layers are conveyed. The draft in the needle machine of the preferred embodiment is preferably about 0-13 mm/stroke. Thus, maintaining a small draft provides the laminate with improved mechanical and flame retardant properties.

Needling is preferably executed at 20 to 90 stitches/cm^2. If pre-needling has been executed, (e.g. at 10 to 40 stitches/cm^2) the stitch density during the final needling is correspondingly reduced. Therefore, by the above described methods bounded fabrics or laminates made of at least one non-woven of organic synthetic fibers and of a non-woven of inorganic staple fibers are provided in a facile and economical manner.

The laminates exhibit good mechanical strength and, in particular, good delamination qualities. Thus, they

may serve as support layer for roofing felts, roofing and sealing membranes, PVC floor coverings and the like. Particularly, they show an elevated dimensional stability and improved flame retardation properties.

Furthermore, the product manufactured by the process outlined above provides dimensional stability and virtually eliminates "neck-down" problems during the impregnation step leading to significantly higher production rates.

In particular the non-woven laminates (e.g. impregnated with bitumen) are endowed, inter alia, with good strength, a favorable flexibility and good delamination properties. These laminates may be manipulated with ease when used as roofing felts in the welding process and the casting process. Additionally, the roof can be walked upon without damaging the felts. In this manner, the carrier laminates do not exert banana curving and possess very favorable properties such as nail tear strength, resistance to tear propagation and peel strength.

The invention will be further explained by the examples provided below, wherein the laminate is consolidated into a final condition without a binder.

Example 1

A random non-woven is prepared by laying up filaments of poly (ethylene terephthalate) on a conveyor. Thereafter, the filaments are pre-

consolidated by needling at 35 stitches/cm². The non-woven then is thermally shrunk.

The area weight of the non-woven was about 150 g/m². This non-woven was combined with a glass staple fibers non-woven (area weight 60g/m²). The glass non-woven was pre-consolidated by a melamine resin and the non-woven was put on the glass non-woven. Then the non-wovens were bounded by needling at 41 stitches/cm² using a draft in the needle machine of 12 mm/stroke. Thereafter, the laminate was subjected to final consolidation by a styrene binder. **The maximum tensile load of the laminate was 563 N/5cm at 35,1% elongation in machine direction and 482 N/5cm at 38,8% in cross direction.**

Example 2

A glass staple fiber non-woven which was pre-consolidated by a melamine form aldehyde binder was laid continuously during the preparation of a polyester filament non-woven in a spunbond facility using six spinning beams. After laying up of the first three curtains on the non-woven layer in direction transported the glass staple fiber non-woven is laid. Thereafter, three further curtains were put on the produced layer. Treatment in a IR path subsequently took place in order to shrink the laminate. Thereafter, the pre-consolidating with 10 stitches/cm² and finally a consolidating with 41 stitches/cm² was done. Thereafter, the laminate was subjected to a final consolidation by a styrene binder.

While the invention has been described in detail with reference to specific embodiments thereof, it will be apparent to those skilled in the art that various changes and modifications can be made, and equivalents employed, without departing from the scope of the claims that follow.

Claims:

1. A laminate, comprising:
at least one pre-consolidated non-woven layer containing glass staple fibers needled with at least one thermally shrunken non-woven layer of synthetic fibers, wherein a portion of the fibers of the upper synthetic non-woven layer passes through the non-woven layer of glass fibers possibly through the underlying synthetic non-woven layer and wherein the laminate contains a consolidation binder.

2. The laminate according to Claim 1, wherein a pre-consolidation resin selected from the group consisting of urea, acrylate and melamine resins is utilized.

3. The laminate according to Claim 1, wherein the gsm substance (basis weight) of said layers of synthetic non-woven layers is equal or different.

4. The laminate according to Claim 1, wherein the synthetic fibers are selected from the group consisting of polyester, poly(ethylene therephthalate) and polypropylene.

5. The laminate according to Claim 1, wherein the synthetic non-wovens fibers are filamentary.

6. The laminate according to Claim 1, wherein the synthetic non-wovens fibers are staple fibers.

7. The laminate according to Claims 1, wherein the laminate comprises two filamentary non-wovens layers of

synthetic and a non-woven of glass containing fibers in a sandwich-structure where the ratio of the gsm substance of the two filamentary non-wovens is 1:1 to 1:5.

8. The laminate according to Claim 7, wherein the ratio of the gsm substance of said two filamentary non-wovens of synthetic is about 1:1 to 1:2.

9. The laminate according to Claim 1, wherein the synthetic non-wovens are mechanically, thermally or hydrodynamically pre-consolidated.

10. The laminate according to Claim 1, wherein, the synthetic non-wovens are not consolidated prior to needling.

11. The laminate according to Claim 1, wherein the synthetic non-wovens are heat shrunken.

12. The laminate according to Claim 1, wherein the non-woven of glass containing fibers includes 5 to 45% by weight of a binder resin.

13. The laminate according to Claim 1, wherein the non-woven of glass containing fibers includes 10 to 30% by weight of a binder resin.

14. The laminate according to Claims 1, wherein the laminate is produced at a minor draft in the needle machine.

15. The laminate according to Claim 14, wherein the needle draft is from about 0 to 13 mm/stroke.

16. The laminate according Claim 1, wherein the non-woven of glass fibers includes reinforcement fibers or yarns running in lengthwise direction, or scims.

17. The laminate according to Claim 1, wherein the non-woven of glass containing fibers includes glass fibers of the E, C, mixtures thereof or ECR glass.

18. The laminate according Claim 1, wherein said synthetic non-woven layer includes filamentary non-woven of polyesters and wherein a part of the polyester filaments penetrate through the non-woven of glass containing fibers and to a side opposite that on which the synthetic non-woven layer is disposed and the filamentary non-woven of polyesters is heat shrunken.

19. A method for the production of a laminate of two or more layers, wherein one or more non-woven mat containing glass staple fibers pre-consolidated with a resin, then disposing said layer beneath or between the non-woven layers of synthetic fibers, wherein the non-woven layers of synthetic fibers and the pre-consolidated non-woven layer containing glass fibers are bounded together by needling in such that a part of the fibers of the upper synthetic non-woven passes through the non-woven layer, heat shrinking the synthetic fibers and subjecting said laminate to a final consolidation through the use of a binder.

20. The method of Claim 19, wherein said pre-consolidation resin is selected from the group consisting of urea, acrylate and melamine resins.

21. The method of Claim 19, wherein said non-woven layers of synthetic fibers are of equal or different thicknesses.

22. The method of Claim 19, wherein a part of the synthetic fibers of said synthetic layer penetrate said non-woven mat of glass containing fibers.

23. The method of Claim 22, wherein a part of the synthetic fibers of said synthetic layer penetrate said non-woven layer of glass containing fibers and the underlying synthetic layer.

24. The method of Claim 19, wherein the synthetic fibers in the non-woven layer is shrunken prior to bonding with the non-woven layer of glass containing fibers.

25. The method of Claim 19, wherein said synthetic fibers are selected from the group consisting of polyester, poly(ethylene therephthalate) and polypropylene.

26. The method of Claim 19, wherein said synthetic non-woven fibers are filamentary.

27. The method of Claim 19, wherein the synthetic non-woven fibers are staple fibers.

28. The method of Claim 19, further comprising needling of said non-woven mat of glass staple fibers and the non-woven layers of synthetic fibers with needles that have a distance between the needle point and the first barb of about 2 to 4 mm.

29. The method of Claim 19, wherein said needling is executed with a forward feed ratio for the stroke of less than 14 mm/stroke.

30. The method of Claim 15, wherein said non-woven layer of glass staple fibers is reinforced with longitudinal fibers, yarns or scrims.

31. The method of Claim 19, wherein said synthetic non-woven is shrunken at temperatures of 140 to 220°C.

32. The method of Claim 15, further comprising shrinking of said laminate at temperatures that corresponds at least to the temperature of a bitumen containing bath used for bituminizing the laminate.

33. The method of Claim 32, wherein said shrinking temperature is up to 30°C above the temperature of the bitumen bath.

34. The method of Claim 19, wherein said non-wovens layer of glass fibers includes fibers of the E, C, mixtures thereof and ECR glass.

35. Method of using the laminate of Claim 1 as support layer for bituminized roofing felts or damp-proof courses.

36. Method of using the laminate of Claim 1 as support layer for bitumen shingles.

37. Method of using the laminate of Claim 1 as support layer for floor covering.

38. The method of Claim 19, further comprising: compressing the laminate with a calender.

39. The method of Claim 38, wherein the calender is a fabric/belt or a laminate calender.

40. The laminate according Claim 16, wherein the reinforcement are disposed within or between the layers of the laminate.